



Subject card

Subject name and code	Energy audit, PG_00055936						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject				2023/2024	
Education level	first-cycle studies	Subject group				Optional subject group Subject group related to scientific research in the field of study	
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	3	Language of instruction				Polish	
Semester of study	5	ECTS credits				2.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Zakład Systemów i Urządzeń Energetyki Ciepłej -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Barański				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		2.0		18.0	50
Subject objectives	The aim of the course is to learn the principles of energy audits of buildings and industrial facilities.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W11] has knowledge of known technologies and non-technical aspects to solve simple engineering tasks in the field of energy systems and devices		The student has knowledge of the known technologies and non-technical aspects to solve simple engineering tasks in the field of power systems and devices.			[SW1] Assessment of factual knowledge	
	[K6_U05] is able to formulate and carry out energy balances in devices and energy systems, also perform an energy audit of a simple building object, is able to perform a preliminary profitability analysis of a planned energy investment		The student is able to perform an energy audit of a simple building, is able to perform a preliminary analysis of the profitability of the planned energy investment.			[SU4] Assessment of ability to use methods and tools	
	[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources		The student knows the basic principles of the operation of energy systems, the environmental effects of the energy technologies used, the ways of using renewable energy sources.			[SW1] Assessment of factual knowledge	
	[K6_K04] is able to formulate opinions on technical and technological processes in energy and sanitary engineering		The student is able to formulate opinions on technical and technological processes in power engineering and sanitary engineering.			[SK5] Assessment of ability to solve problems that arise in practice	

Subject contents	<p>Lecture:</p> <p>Energy standards of buildings. Thermal comfort. Calculations of heat losses and gains. Energy demand. Energy needs of buildings (heating, hot water preparation, ventilation and lighting). Principles of performing energy audits of buildings.</p> <p>Laboratory: Calculation of heat demand for a building using Audytor OZC software. Formulating thermomodernization projects and determining optimal thermomodernization improvements.</p>											
Prerequisites and co-requisites	<p>Basic knowledge of technical drawing, mathematical calculations, basics of heat transfer processes. Student can obtain information from literature, databases and other properly selected sources; also in English in the field of energy, is able to integrate the information obtained from many fields, interpret and critically evaluate it, as well as draw conclusions and formulate and exhaustively justify opinions. He is ready to critically assess and analyze issues and recognizes the importance of knowledge in solving cognitive and practical problems in the field of energy.</p>											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 761 796 797">Subject passing criteria</th> <th data-bbox="796 761 1142 797">Passing threshold</th> <th data-bbox="1142 761 1487 797">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 797 796 833">laboratory report</td> <td data-bbox="796 797 1142 833">56.0%</td> <td data-bbox="1142 797 1487 833">20.0%</td> </tr> <tr> <td data-bbox="448 833 796 869">written test</td> <td data-bbox="796 833 1142 869">56.0%</td> <td data-bbox="1142 833 1487 869">80.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	laboratory report	56.0%	20.0%	written test	56.0%	80.0%
Subject passing criteria	Passing threshold	Percentage of the final grade										
laboratory report	56.0%	20.0%										
written test	56.0%	80.0%										
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Aktualne przepisy prawne obowiązujące w zakresie sporządzania audytu energetycznego oraz świadectw charakterystyki energetycznej budynków (ustawy, rozporządzenia) 2. Ogrzewnictwo praktyczne, Halina Koczyk, Bronisława Antoniewicz i inni Systherm 2014 3. Dydenko J.: Charakterystyka energetyczna i audyt budynków przepisy z wprowadzeniem. Wydawca: Wolters Kluwer 2009 4. Górzyński J.: Podstawy analizy energetycznej obiektów budowlanych. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2012 5. Kurtyn K., Gawin D.: Certyfikacja energetyczna budynków mieszkalnych z przykładami. Wydawnictwo: Wrocławskie Wyd. ALTA2 6. Laskowski L.: Ochrona cieplna i charakterystyka energetyczna budynków. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005 7. Lejdy B.: Instalacje elektryczne w obiektach budowlanych. Wydawnictwa Naukowo Techniczne 8. Mizielińska K., Olszak J.: Gazowe i olejowe źródła ciepła małej mocy. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005 9. Ulbrich R.: Audyt energetyczny a dom energooszczędny. Oficyna Wydawnicza Politechniki Opolskiej. Opole 2000 										
	Supplementary literature	<ol style="list-style-type: none"> 1. Halina Koczyk , Bronisława Antoniewicz: Nowoczesne wyposażenie techniczne domu jednorodzinnego Instalacje sanitarne i grzewcze 2. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie. 										

	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>Definition of an energy audit.</p> <p>Types of energy audits and methods of conducting them.</p> <p>Ways to reduce heat demand in residential and industrial buildings.</p>	
Work placement	Not applicable	